

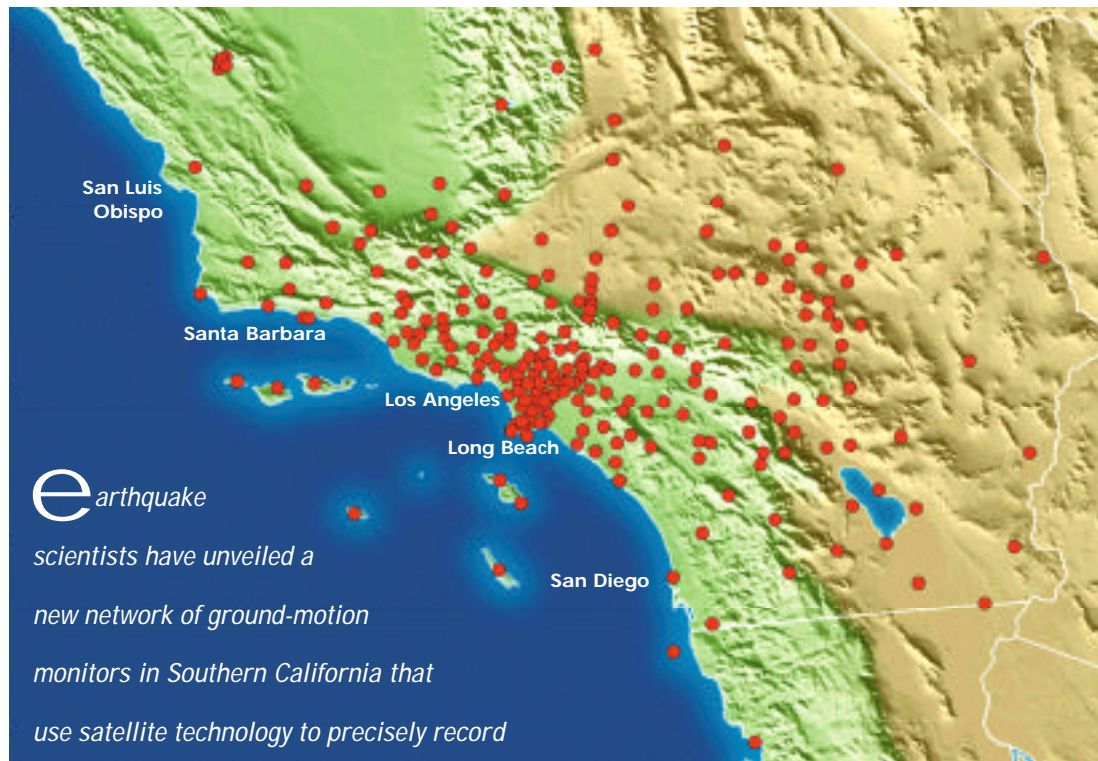
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Quake-monitoring network unveiled

JPL a key player in developing array throughout Southern California

By Mark Whalen

Locations for GPS earthquake monitoring stations include, at left, Elysian Park, near downtown Los Angeles; Joshua Tree National Park; bottom center; and along the Glendale Freeway in Glendale, right. At top center, near the GPS station in Glendale is an instrument connected to a laser strainmeter, embedded in the freeway to measure how much stretching or compressing is taking place.



Southern California Earthquake Center

millimeter-level motions of the Earth's crust. JPL is one of the major partners and leaders in the development of the network.

Unlike other earthquake networks that record shaking, the Southern California Integrated GPS Network tracks the slow motion of Earth's crust by using signals from the Global Positioning System (GPS)—a constellation of satellites, originally designed for military navigation, that are used to determine precise locations on the ground. With the new network, the link between the motions of the plates that make up Earth's crust and the resulting earthquakes is now being observed continuously by an array of GPS stations operating across Southern California and northern Baja California—one of the world's most seismically active and highly populated areas. On July 2, the 250th station in the network was installed at Joshua Tree National Park.

The GPS network is jointly operated and managed by JPL, the Scripps Institution of Oceanography at UC San Diego and the U.S. Geological Survey, under the umbrella of the Southern California Earthquake Center, a science and technology center for the National Science Foundation. Major funding for the network has been provided by NASA, the W.M. Keck Foundation, the National Science Foundation and the U.S. Geological Survey.

Dr. Frank Webb of the Tracking Systems and Applications Section 335, the network's program manager at JPL, is a member of the network's Executive Committee, representing the Laboratory and the Satellite Geodesy and Geodynamics Systems Group. He noted that the \$20 million project was spurred by the 1994 Northridge earthquake. At that time, less than five continuously operating GPS stations existed in Southern California. JPL, with support from NASA, led the initial efforts to build the network up to 250 stations.

"decades ago, NASA began looking at the plate motions by using large radio telescopes around the world," he said. "With investments by NASA in GPS technology at JPL, we improved the necessary ground systems and processing capability to the point that motions as small as a millimeter (about one twenty-fifth of an inch) per year can be observed with lower cost and easier-to-place GPS instruments, allowing us to deploy a dense geodetic network that is giving us a much sharper picture of the tectonic deformation that occurs across the faults in Southern California."



Photo courtesy of Southern California Earthquake Center



Bob Brown / JPL Photo Lab



Photo courtesy of Southern California Earthquake Center



Bob Brown / JPL Photo Lab

Over the last seven years, the network has grown rapidly from only a few stations in 1994, about 50 in 1998, to 250 at present. Almost all stations have been placed on public lands, such as schools and parks. Many of them are located on the facilities of public agencies that will benefit from seismic studies and on property used by organizations that reply on GPS for surveying. The Metropolitan Water District, for example, has allowed stations to be placed near pumping plants aside aqueducts and uses the data for surveying and monitoring the deformation around dams, aqueducts and aquifers.

The locations secured at community colleges and schools have provided additional benefits, in many cases becoming a focal point for students interested in learning science. "JPL has also developed

an educational module, with CD-ROMs and other materials, to teach kids about earthquakes and the GPS technology," Webb said.

Using the network's data to measure deformation of Earth's crust—which can occur as the sudden movement along faults during earthquakes or as the slow distortion of the ground between earthquakes—scientists can investigate the processes that control how strain builds up slowly over time before being released suddenly during earthquakes. The accumulated strain is directly related to earthquake potential, and measurement of it contributes to earthquake hazard assessments that help motivate people to prepare for earthquakes.

With the completion of this phase of the network, Dr. Ghassem Asrar, associate administrator for Earth science at NASA, noted, "Southern California becomes the premier laboratory for earthquake research in the nation." Research using the network's data, he said, will provide other government agencies, states, and local communities with new knowledge of these dangerous events.

Along those lines, the new GPS network, together with the Southern California Earthquake Center, has led efforts to develop interagency partnerships. Webb said researchers in the

Pacific Northwest, Nevada, Utah and Northern California's Bay Area "have seen our success, and now there are several similar arrays in North America."

Dr. Margaret Leinen, assistant director for geo-

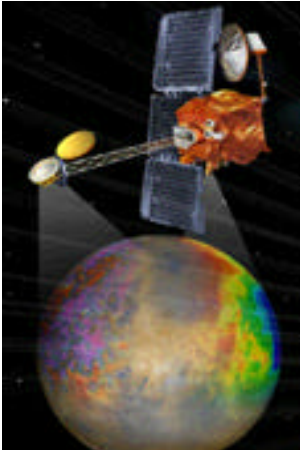
sciences at the National Science Foundation, noted that the new GPS network was "a model for interagency collaboration and for the leadership needed to get a big project like this done." As a result of these successes, scientists are planning even bigger arrays across all of western North America.

The GPS network has already begun to provide valuable earthquake-related data to scientists, surveyors, utilities,

emergency planners, government agencies and others. The data are freely available over the Internet (www.scign.org). The majority of the hundreds of data users are scientists working in universities and government agencies around the world.

For more information about the Southern California Earthquake Center and the Southern California Integrated GPS Network, visit www.scec.org or www.scign.org.

News Briefs



Launched April 7, the 2001 Mars Odyssey spacecraft is now more than halfway to Mars.

Odyssey more than halfway to Mars

At 8:30 a.m. Pacific time July 16, JPL's 2001 Mars Odyssey spacecraft passed the halfway point on its journey to Mars. Monday marked 100 days since Odyssey's launch and now less than 100 days remain until its Oct. 24 arrival at the Red Planet.

"Odyssey is now closer to Mars than Earth," said DAVID A. SPENCER, the Odyssey mission manager at JPL. "The spacecraft is healthy and all systems are looking good. Planning for Mars approach and orbit insertion in October is our primary focus right now."

The navigation team reports the spacecraft is right on course. To date, the Deep Space Network has taken 11 separate measurements using the so-called delta differential one-way range measurement, a technique that uses two ground stations to determine the angular position of the spacecraft relative to the known position of a quasar. The measurements provide the navigation team with an additional source of information, adding confidence to their estimates of the Odyssey flight path.

As of Monday, Odyssey was 45.8 million kilometers (about 28.5 million miles) from Earth and 30 million kilometers (about 19 million miles) from Mars, traveling at a velocity of 26 kilometers per second (58,000 mph) relative to the Sun.

Viking celebrates 25th anniversary

Twenty-five years ago, on July 20, 1976, NASA's Viking 1 lander soft-landed on the surface of Mars, becoming the first successful mission to land on the Red Planet, as well as the first successful American landing on another planet.

With a second lander later joining the first on the surface and with two orbiters circling the planet, the Viking project changed our understanding of that alien world. Its treasure trove of images and data covering the entire Martian globe remains a valuable scientific resource for the study of Mars.

"JPL designed and built the two Viking orbiters and we are extremely proud of the Lab's history with Project Viking," said DR. FIROUZ NADERI, manager of the Mars Exploration Program at JPL. "The success of that mission set the stage for our current and future slate of spacecraft."

NASA's Langley Research Center was responsible for managing Project Viking, and in April 1978 turned the project over to JPL.

Deadline nigh for research proposals

The pre-proposal deadline for fiscal year 2002 Director's Research and Development Fund proposals is Friday, July 27.

This deadline is for major "Lab thrust" proposals only (either for the current astrobiology topic or for additional topics). This pre-proposal will be reviewed by the Science and Technology Management Council, which will provide guidance to the investigator on whether

they should proceed to submit a full proposal.

Proposers should send a hard copy of one-page pre-proposals to CRAIG SCHLUE at mail stop 241-242 as well as an e-mail copy to him. The pre-proposal should contain the Lab thrust addressed, a list of investigators, total budget, technical background, work to be performed, and anticipated results and value to the thrust area.

The Director's Research and Development Fund supports research in innovative science and breakthrough technologies. It encourages university collaborations and cross-pollination between technical divisions to enhance JPL's skill base. Since space missions are fundamentally limited by technology, any breakthrough technology offers a possibility of bypassing today's limitations and leads to revolutionary, highly innovative improvements in space science and missions.

Full proposals for both Lab thrusts and seed efforts for innovative science and breakthrough technologies are due Sept. 7. For more information, log on to <http://drdf.jpl.nasa.gov>.

Depression, alcohol screening available

JPL's Employee Assistance Program is offering employees, and the adult members of their families, an opportunity to take a free, anonymous and confidential telephone and on-line screening for depression and alcohol problems. The program is designed to help individuals recognize the signs of depression and alcohol misuse and learn how and where to get help.

Both illnesses are highly prevalent and can be treated. Between 17 million and 20 million Americans experience depression each year. More than 14 million Americans have an unhealthy relationship with alcohol. And for some, alcohol use is connected to underlying problems like depression.

To participate in the screening, call (800) 390-7302 or log on to www.mentalhealthscreening.org/screening, where the password is HEALTH.

Symptoms of adult depression include persistent sad or empty mood; loss of interest or pleasure in ordinary activities; changes in appetite or sleep; decreased energy or fatigue; inability to concentrate or make decisions; feelings of guilt, hopelessness or worthlessness; and thoughts of death or suicide.

- Alcohol warning signs to consider:
- Has anyone close to you ever worried or complained about your alcohol use?
 - Have you ever tried to quit or cut down with only temporary success?
 - Have you ever wondered whether you have an alcohol problem?

For more information on the screening, or on depression and alcohol misuse, call the Employee Assistance Program at ext. 4-3680. If you or a loved one has scored positive on the screening, you are encouraged to call the EAP office for a referral, or call your health-care provider.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

End of Life Issues and Bereavement—Meets the second Monday of the month at noon. For location, call the Employee Assistance Program at ext. 4-3680.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 125-133. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—No meetings are scheduled for July; next meeting is Aug. 16. For location, call the Employee Assistance Program at ext. 4-3680.

Senior Caregivers Support Group—No meetings are scheduled for July or August; next meeting is Sept. 6. For time and location, call the Employee Assistance Program at ext. 4-3680.

Friday, July 20

Coping With Chronic Health Problems—Dr. Janet Kramer, director of the Wellness Community in Pasadena, will speak at noon von Kármán Auditorium on the impact of illness on the patient and family; how it can affect work; methods for coping with the stress it creates; and minimizing the impact on family. For questions, call the JPL Employee Assistance Program, ext. 4-3680.

"Understanding via the Visualization of Large, Earth Science Data Sets"—This presentation from 3 to 4:15 p.m. in von Kármán Auditorium will include: Amazonian forests and wetlands as viewed by synthetic aperture radar and airborne digital videography, by Dr. Bruce Chapman of JPL and Dr. Laura Hess of UC Santa Barbara; the geological history of San Diego, by professor Pat Abbott, San Diego State University; and "Lewis and Clark: Search for the NorthWest Passage," by Dr. David Curkendall of JPL and Abbott. Sponsored by Institutional Computing and Information Services and the Office of Communications and Education.

Von Kármán Lecture Series—"Mars Exploration: From the Vikings to the 21st Century" will be presented by Dr. John Callas, Mars Exploration Rover Science Office manager, at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Wednesday, July 25

Investment Advice—Fidelity will hold individual counseling sessions from 9 a.m. to 3 p.m. in T-1720. For an appointment, call (800) 642-7131.

JPL Toastmasters Club—Meeting at 5 p.m. in the Building 167 conference room. Guests welcome. Call Joy Hodges at ext. 4-7041.

Thursday, July 26

Eudora Solutions—Help Desk personnel will demonstrate Eudora capabilities that can save PC and Mac users time and work more efficiently. The focus will be on solutions to problems frequently encountered by those who use Eudora on institutional e-mail servers. To be held at noon in von Kármán Auditorium.

JPL Golf Club—Meeting at noon in Building 306-302.

Friday, July 27

Caltech Folk Music Society—Irish band Danú will appear in Caltech's Dabney Lounge at 8 p.m. The seven-member group features accordion, fiddle, Uilleann pipes, bodhran, flute, bouzouki, and guitar, and the music is an assortment of jigs, polkas, reels and songs. Tickets are \$15 for adults and \$4 for children under 12 and are available in advance and at the door. For information, call (626) 395-4652 or check the Folk Music Society Web site at <http://www.cco.caltech.edu/~folkmusi>.

Wednesday, August 1

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Thursday, August 2

JPL Gun Club—Meeting at noon in Building 183-328.

JPL Stories—Mariner 10 mission analyst Donna Shirley will discuss the mission, also known as Venus/Mercury 1973, in "Perils of Pauline—or Failing All the Way to Mercury (3 times)" at 4 p.m. in the customer service area of the Library, west end of Building 111, room 104. For questions about the JPL Story series or to participate, call Teresa Bailey at ext. 4-9233.

Friday, August 3

"The Quest for Mission Success: the Clementine Mission"—Dr. Trevor Sorensen, former Clementine Lunar Mission Manager, will speak from 1:30 to 3 p.m. in the Building 167 conference room. Sponsored by the Reliability Engineering Office 513.

70-day Jupiter movie pulls patterns out of chaos

By Guy Webster

Right: Jupiter as imaged by Cassini on Jan. 15 during the spacecraft's flyby on the way to Saturn.



A kaleidoscopic movie made from about 1,200 Jupiter images taken by the JPL-managed Cassini spacecraft reveals unexpectedly persistent polar weather patterns on the giant planet.

Long-lived storms and globe-circling belts of clouds are familiar features around Jupiter's midsection, easily seen even in still pictures. Closer to the poles, though, still images show widespread mottling that appears chaotic.

"You'd expect chaotic motions to go with the chaotic appearance, but that's not what we see," said the planetary scientist who put the movie together, Dr. Ashwin Vasavada of Caltech. "The movie shows that the small spots last a long time and move in organized patterns."

Cassini shot the images in infrared light to cut through Jupiter's upper haze and show the clouds underneath in black and white. The movie clip combines those images taken over a span of 70 days into a sequence less than a minute long.

The version centered on the north pole and another version showing the entire planet are available online at <http://www.jpl.nasa.gov/videos/jupiter> and from the Cassini imaging science team's site at <http://ciclops.lpl.arizona.edu>.

Caltech planetary scientist Dr. Andrew Ingersoll, a member of the Cassini imaging team, said the movie also gives insight into storms' duration in Jupiter's high latitudes. "There are thousands of storms there the size of the biggest storms on Earth," he said. "Until now, we didn't know the lifetime of those storms." The movie shows thousands of spots bumping into each other but generally moving together within each band of latitude. The spots occasionally change bands or merge with each other, but usually they last for the entire 70 days. Each spot is an active storm in Jupiter's atmosphere.

"The smaller and more numerous storms at high latitude share many of the properties of

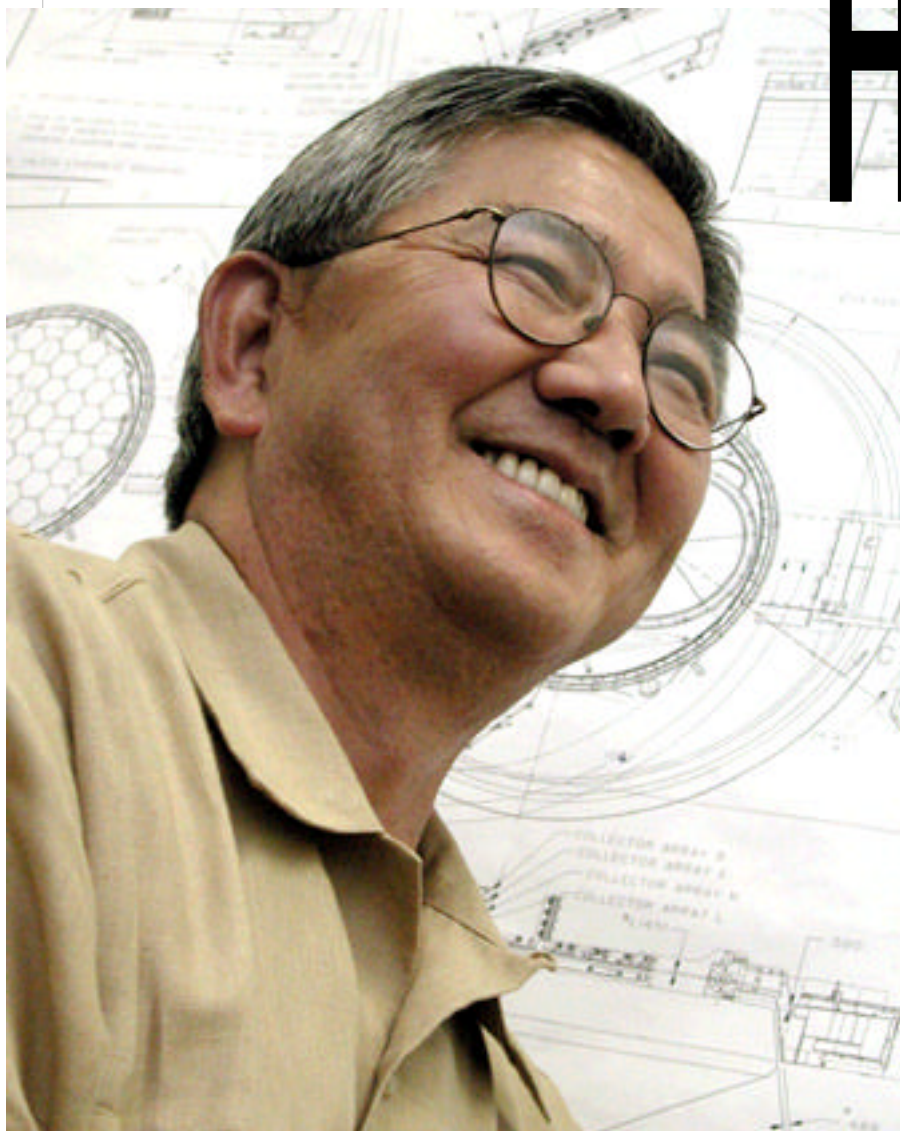


their larger cousins like the Great Red Spot at lower latitudes," Ingersoll said.

The mystery of Jupiter's weather is why the storms last so long. Storms on

Earth last a week before they break up and are replaced by other storms. The new data heighten the mystery because they show long-lived storms at the highest latitudes, where the weather patterns are more disorganized than at low latitudes.

"Perhaps we should turn the question around and ask why the storms on Earth are so short-lived," Ingersoll said. "We have the most unpredictable weather in the solar system, and we don't know why."



HERE COMES THE SUN

By Martha Heil and Mark Whalen

Genesis, set for a July 30 launch, will bring the solar wind to Earth for a dramatic helicopter capture

JPL's next robotic space explorer is ready to do a little sunbathing on a mission to catch a wisp of raw material from the luminous celestial body around which the Earth and other planets revolve.

The Genesis mission, set for launch July 30 from Florida's Cape Canaveral Air Force Station, is designed to collect pieces of the Sun and return them to Earth. The mission is expected to capture about 10 to 20 micrograms of the solar wind, made up of isotopes (charged particles) expelled by the Sun.

The particles, about the weight of a few grains of salt, will be returned to Earth with a spectacular mid-air helicopter capture in 2004. Scientists will preserve this treasured smidgen of the Sun in a special laboratory for study. The researchers hope to answer fundamental questions about the exact composition of our star and the birth of our solar system.

Chet Sasaki, a veteran of more than 20 years at JPL who has always aspired to manage a major project, is getting his first opportunity to do so, with a first-of-its-kind and possibly history-making endeavor.

"This mission will be the Rosetta Stone of planetary science data, because it will show us the foundation by which we can judge how our solar system evolved," Sasaki said. "The samples that Genesis returns will show us the composition of the original solar nebula that formed the planets, asteroids, comets and the Sun we know today."

"Genesis will return a small but precious amount of data crucial to our knowledge of the Sun and the formation of our solar system," said Dr. Donald Burnett of Caltech, principal investigator and leader of the mission. "Data from Genesis will provide critical pieces for theories about the birth of the Sun and planets."

In October 2001, Genesis will have traveled to a point about 1.5 million kilometers (about 1 million miles) away from Earth—about 1 percent of the way toward the Sun—where gravitational and centrifugal forces acting on the spacecraft are balanced, known as the Lagrange 1 point, or L1. Genesis will then be well outside Earth's atmosphere and magnetic environment, which will allow it to gather pristine samples of the solar wind.

The spacecraft carries four scientific instruments: bicycle-tire-sized solar-wind collector arrays, made of materials such as diamond, gold, silicon and sapphire, designed to entrap solar wind particles; an ion monitor, which will record the speed, density, temperature and approximate composition of the solar wind; an electron monitor, which will make similar measurements of electrons in the solar wind; and an ion concentrator, which will separate out and focus elements in

the solar wind like oxygen and nitrogen into a special collector tile.

Sample collection will conclude in April 2004, when the spacecraft returns to Earth. Genesis will be the first mission to return a sample of extraterrestrial material since the Apollo 17 mission to the moon in 1972.

In September 2004, the solar samples will be returned in a dramatic helicopter capture. As the Genesis return capsule parachutes toward the ground at the U.S. Air Force's Utah Testing and Training Range, a helicopter will catch it on the fly to prevent the delicate samples from being disturbed by the impact of a parachute landing.

"A number of tests showed that the hardware was survivable for a landing under the right conditions, but the right conditions might not necessarily exist," Sasaki said. "For example, some of the solar-wind samples might have damage from micrometeorites, so we wanted to minimize the damage to the samples. But once the canisters enter re-entry mode, they are safe."

The samples will be taken to NASA's Johnson Space Center in Houston, where the collected materials will be stored and distributed for analysis. Scientists anticipate that, in addition to today's capabilities, new analytical techniques developed in coming decades can be used to study the solar matter returned by Genesis.



Data analysis will be performed much like was done on the moon rocks, Sasaki said, where scientists will submit proposals to do the research.

"Not all facilities and capabilities for sample-return analysis have been developed yet," he said. "One of the benefits of the sample return mission is we can keep on developing instrumentation for analysis. Three years from now we'll have better capabilities than we do now;

10 years from now we'll have even better capabilities. The idea is not to squander your resources before the analysis technology is developed."

Researchers believe the surface of the Sun, from which the solar wind originates, has preserved the composition of the solar nebula from which all the different planetary bodies formed. Study of Genesis' samples is expected to yield the average chemical composition of the solar system to greater accuracy. It will also provide clues to the evolutionary process that has led to the incredible diversity of environments in today's solar system.

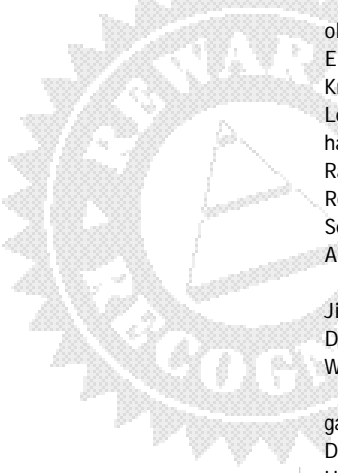
"Scientists do know which materials are most abundant in the solar system," Sasaki said. "What they don't know quantitatively are the isotopic ratios of the different elements and, with high precision, the elemental abundances. We've created some super-pure material to be the collectors or the containers of the solar wind, and we expect a full range of elements; in fact, the entire periodic table. The distribution of the elements will be the discoveries."

Genesis is sponsored by NASA's Discovery Program, which competitively selects low-cost solar system exploration missions with highly focused science goals.

Additional information is available online at <http://genesismission.jpl.nasa.gov>.

Genesis Project Manager Chet Sasaki says the mission will be "the Rosetta Stone of planetary science data, because it will show us the foundation by which we can judge how our solar system evolved." Genesis' solar-wind collector arrays, left, are made of materials such as diamond, gold, silicon and sapphire.

NOVA awards



The following employees received recognition as winners of JPL's Notable Organizational Value Added (NOVA) awards for July and August. Organization numbers represent the NOVA unit in which the nomination was made.

For more information on the awards, log on to <http://eis/sec614/reward/nova01.html>.

Section 100: Ruben Becerra, Thomas Berry, Carolina Carnalla-Martinez, Jayne Dutra, Vance Heron, Elizabeth Herrera, Douglas Hughes, Scott Hulme, Kristina Kim, Vicki Laidig, Carmen Lam, Stephanie Lear, Sauwan Leung, Charlotte Marsh, Angela McGahan, Joon Park, Iris Pedrosa, Robert Powers, Paul Ramirez, Michael Razeggi, Charles Rhoades, Vic Rodriguez, Myriam Ruiz, Daniel Sedlacko, William Seixas, Rachel Skinner, Nicole Thai, Beth Verish, Alice Wessen, Mark Whalen.

Section 220: Florencio Cunanan, Robert Hanna, Jienming Jou, Linda Kang, Krishna Kunamaneni, Dennis Lo, Sella Moursalian, Vuong Phan, Haiyan Wang, Beth Wilson, Sahar Yousef.

Section 260: Steve Alfery, Leslie Berridge, Margaret Cooper, Carolina Coppolo, Jeff Cornish, Adolfo Delgado, Diane Garinger, Richard Hillquist, Christine Horowitz, Bill Kert, Stan Packard, Geoffrey Pomeroy, Lorraine Reeves, Michele Schneider, Christine Zuro.

Section 270: Rose Acklerley, Sandra Menotti,

Devin Simmons, Carolyn Squillace, Marc White, Linda Worrel.

Section 311: Robert Carnright, Sandra Dawson, Govind Deshpande, George Fox, Janis Graham, Edward Greenberg, Jairus Hihn, Michele Johnson, Greg Kazz, Barnwell Legge, Frances Mulvehill, Robert Oberto, Thomas Pastorius, Tamara Roust, Troy Schmidt, James A. Smith, Shirley Stroup, Carlos Velez Jr., Keith Warfield, James Wood, Diane Wright.

Section 314: Kerry Erickson, Brian Hammer, Nora Mainland, Albert Nakata, Mark Rokey, Donald Royer, Marla Thornton, Ricardo Torres, Bruce Waggoner.

Section 334: Torry Akins, Janice Ball, William Fiechter, David Imel, Charles T C Le, Marsha McGhee, Gary Hamilton, Gregory Neumann, Leslie Nguyen, Theresa Pace, Patricia Rollins.

Section 335: James Border, Susan Finley, Charles Goodhart, Byron Iijima, Christopher Jacobs, Andre Jongeling, Gabor Lanyi, Stephen Lowe, Sumita Nandi, Jean Patterson, Timothy Rogstad.

Section 336: Brian Cook, Joyce Donato, Frank Ott, Ernest Stone.

Section 344: Anwar Akhtar, David Calkins, Kenneth Crabtree, Dwight Geer, John Gilbert, Charles Hand, Mitra Hartmann, Pooya Iranpour, Keizo Ishikawa, Alfred Khashaki, Martin Le, Yee Lee, Misrahim Morales, Minnie Perry, Julianne Romero, Donald Schatzel, Carl Steiner, Stephen Tseng, Frank Zee.

Section 345: James Alexander, Harry Balian, Edward Barlow, David Bayard, Dhemetrio Boussalis, William Breckenridge, Jay Brown, Paul Brugarolas, Larry Chang, Hari Das, Chris Granger, Fred Hadaegh, Robert Ivlev, Bryan Kang, Danny Lam, Edward Mettler, Mauricio Morales, Scott Peer, Marco Quadrelli, Frederick Serricchio, George Sheasby, Joel Shields, Gurkirpal Singh, Samuel Sirlin, John Spanos, Arthur Thompson, Edward Tunstel, Charles Vanelli, Matthew Wette, Edward Wong.

Section 346: Bruce Bumble, Rebeca Chacon, Jacob Chapsky, Stephanie Cowans, Debra Cuda, Serge Dubovitsky, Pierre Echternach, Pawan Gogna, Virginia Guzman, Alexander Ksendzov, Annette Laster, Henry Leduc, Carol Lewis, John Liu, Kamjou Mansour, Suzanne Martin, Kelly Megerier, Annie Murray, Sekharipuram Narayanan, Patricia Patterson, Daniel Pinion, Judith Podosek, Yueming Qiu, Don Rafol, Carl Ruoff, Adriana Wall, Emily Wesseling, William West, Victor White.

Section 349: Peyton Bates, Elisa Garcia, Marian Meridieth, Matthew Mori, Jerry Mulder, Tran Ngo-Luu, Heather Parsons, Mau-Huu Tran, Flora Yang.

Editor's note: Due to space limitations, the remainder of NOVA winners for July and August will be published next month.

Passings

EUGENE HEADRICK, 81, a retired senior test mechanic in Section 352, died of emphysema June 25.

Headrick worked at the Lab from 1946–84. He is survived by his wife, Norma, daughter Judy Reid, two grandchildren and two great grandchildren. Services were private.

ERHARD BURKERT, 81, a retired senior engineer in Section 511, died of congestive heart failure June 30. Burkert joined JPL in 1977 and retired in 1985. He is survived by his wife, Doris, six children, 17 grandchildren and 1 great grandchild. Services were private.

THOMAS TESAREK, 67, a retired member of the engineering staff in Section 333, died of cardiac arrest June 30 at his home in Victorville. Tesarek worked at JPL from 1978–99. He is survived by his wife, Sandra, seven children and six grandchildren. Services were private.

ROBERT WHITCOMB, 85, a retired member of the technical staff in Section 201, died of heart failure June 30. Whitcomb joined the Lab in 1962 and retired in 1987. He is survived by daughters Cheryl and Karen. Services were private.

Corrections

In the July 6 issue of Universe, two articles in the Passings column require clarification.

The article reporting the passing of Elmer Hastings should have indicated that he joined JPL in 1960 and that his cause of death was heart failure.

The article reporting the passing of James Blain should have indicated that he is survived by his wife, Pilar, as well as his children and grandchildren.

Classifieds

For Sale

AIR CONDITIONER, window mounted, G.E., 8,000 BTU, like new, hardly used, \$175. 626/794-8737.

AIR CONDITIONER, window, Fedders, 10,000 BTU, clean, exc. cond., 12 months old, fits windows up to 39" wide, \$150. 626/796-4218.

AIRLINE ticket, round trip, anywhere Southwest flies, must complete travel by Aug. 8, 2001, \$300/obo. 626/355-3886, Rosemary.

BABY ITEMS: "holders," Bellini crib, "Milano," natural wood, \$150; Graco Tot-Loc 2-pc. infant car seat, base + carrier, \$50; misc. other items incl. booster seat, soft carriers, table clip-on infant chair. 709-0208.

CELL PHONE, Audiovox 4000, two, inc. car & home chargers, headset and case, \$75/both. 362-7187.

COFFEE, top of the line 100% pure Kona,

hand-picked from top quality trees, 100% sun dried, rich, dark roast, ltd. supply, discounted 45% at intro price of \$21/lb. 626/584-9632.

CEMETERY LOTS, Rose Hills Whittier, 2 side-by-side, "Poplar Lawn" near Japanese Gardens, \$1,500/ea or \$2,500/both. 626/296-3782.

DAY BED, twin, and mattress, used for only 6 months, exc. cond., black metal with a moon, sun, and star on backboard with gold accents, will e-mail photo upon request, \$150. 626/688-7659, leave msg.

BOOKCASE, white, tall, adj. shelves, from Plummers, \$20; ROTISSERIE/GRILL, Farberware, \$25. 790-3543.

EXERCISE EQUIPMENT, low-impact Elliptical Exercise Machine ProForm, 485 E Model 927, bought new last year from Sears for \$390, like new, \$200/obo. 626/284-4694.

LUGGAGE CARRIERS, rooftop, Sears fiberglass, \$50; SOFT CARRIER, new, \$20. 626/797-6982.

MINERAL COLLECTION, quartz, etc., left over from 1978 science fair display, \$75 for everything or call for price per mineral. 626/403-0025.

MONITOR, 17 inch, 0.26 mm dot pitch Viewsonic Optiquest V775, sharp image and text, right up to 1152 x 864 at 85 Hz, cannot display blue (appears black) and has a greenish tint, reds, yellows, and greens show up, in original box with 15-pin cable and power cord, \$40. 626/683-0706.

MOVING SALE, living & dining room furniture, all like-new, exc. cond., Italian travertine dining set w/8 chairs, 4-piece sofa set, matching coffee and 2 side tables, leather sofa & love seat. 547-6347, Noushin.

NOTEBOOKS, Fujitsu 655TX, Pentium 150 MMX, 80MB RAM, 1.3 GB HD, 12.1" active matrix screen, built-in 33.6 fax/modem, external floppy drive, dual lithium ion battery, ultrathin about 1", 4.4 lbs, 3 units available, \$250/ea. 626/308-2163.

PALM 100, handheld, brand new, in original packaging, retail \$120, will sell \$100. 661/257-4350.

PIANO, Clavinova digital, Yamaha CLP 411, 3 yrs. old, exc. cond., black, \$1,900/obo. 626/333-8310.

PLAYER PIANO, 1920s, Henderson w/Gulbranson player, older restoration, \$1,200/obo. 626/797-8562.

PRINTER, HP LaserJet II, incl. manuals cables, etc., \$200/obo. 323/665-3439.

SOFA, sectional sleeper, makes into queen-size bed, attractive abstract water color design in cream, aqua, mauve, great condition, \$350; COFFEE TABLE, white oak finish, with glass panels, like new, \$100; see photos at ERC or call for e-mail photo. 830-8993, eve & wkend, 903-8979, cell.

TABLE, dinette, square glass top 5' x 5' w/metal feet and 4 matching chairs, \$700/obo; BAR STOOLS, four matching bar stools, metal frame, all in superb condition, \$300/obo. 626/398-3480.

TREADMILL, Pro-Form foldway space saver, 2.5 HP w/power incline, automatic workout programs, 10 mph, like new, \$295. 626/286-1883.

WASHER, Whirlpool compact automatic, moveable/portable installation, exc. cond., 18 months old, ideal for apartment/condo, cost \$500, sell for \$200/obo. 626/796-4218.

WASHER/DRYER SET, GE Premier Line, 3 yrs. old, matched white set, huge capacity, cost \$1,000, sell for \$600. 790-6185, Tim or captrts@aol.com.

WET SUIT, men's size large, jacket and Farmer John pants, Body Glove, \$20/ea; SWIM FINS, heavy duty, \$15. 626/794-2431.

WHEELCHAIR, power, Ezereest & Jennings, exc. cond., 9 mo. old, almost new, used only inside, \$3,500/obo. 626/798-0033, Denise.

Vehicles/Accessories

'97 DODGE Stratus, 83,500 mi., a/c, auto, power doors/windows/mirrors, radio/cassette, ABS, silver, exc. cond., orig. owner, \$6,200. 367-1063.

'97 FORD F150 XLT Supercab, 4.8L, V8, white, automatic, a/c, power locks/windows/steering, cruise control, towing package, bed liner, exc. cond., 48K mi., \$13,500/obo. 626/429-3830.

'97 FORD Mustang, red, 46K mi., auto, pwr. win/door, sporty looking with rear spoiler, \$10,750. 626/856-8723.

'96 FORD Escort LX, exc. cond., 5 spd., 2 dr., 57,000 miles, a/c, am/fm/cassette, exterior red, interior gray, \$5,900/obo. 909/980-3508.

'93 FORD Aerostar van, green w/gray interior, 109K mi., a/c, clean, good cond., \$3,100. 626/301-9965.

'93 HONDA Nighthawk, 750 cc, 4 cyl., new Plexifairing 3 Corbin seat, very clean, dependable, \$2,400/obo. 367-0969.

'95 JEEP Wrangler Rio Grande, 4 cyl., 52K mi., pearlstone/tan, soft top, ARB rear locker and air comp, BFG A/Ts, exc cond, \$11,500. 626/351-1335.

'90 NISSAN 240SX SE Fastback, 5 spd., flip-up sunroof, power steering, tilt wheel, cruise, AM/FM stereo, single owner, well-maintained, all records, runs/handles great, 100K mi., good cond., \$3,600/obo. 323/467-4742.

'91 SUBARU Loyale 4D wagon, 149K miles, 5 spd., 2 w/d, must sell, very well maintained, a/c, power locks/steering/windows, CD, alloy wheels, tilt wheel, Yakima roof rack, new tires, new clutch, recently repaired transmission, a/c & timing belt, runs great, call for digital pictures, Kelly Blue Book \$3,755, sell for \$2,900/obo. 507-5632 or 626/379-0969.

'91 TOYOTA Corolla Deluxe, metallic blue, 4-dr. sedan, 5 spd., 4 cyl., 1.6L, a/c, 134K mi., good cond., all maintenance records, \$3,500/obo. 626/578-7587.

'89 TOYOTA short bed pickup truck, 4-spd. manual, 115K mi., exc. cond., very well maintained, a/c, Sony AM/FM/CD, \$3,600. 248-7796.

Lost & Found

FOUND:Motorola cell phone in Building 144. Contact Geoff Laugen @ 4-9350 (144-118) to claim.

Wanted

ANTIQUE LINENS, white on white, hand-embroidered, preferably monogrammed (any monogram), must be in exc. cond. 980-1638. HOUSING, visiting scientist w/family looking for furnished house/apt. for month of Aug. Ext. 4-7391 or 562/693-2986.

MOTORSCOOTER, Vespa or Lambretta, any year or condition, running or not, for JPL student employee. newwave101@yahoo.com or 323/721-5584, Dorian.

POOL TABLE, used, good cond. 909/468-5907.

SHOPPERS: "Shop Til You Drop," Wed., July 25, 5:30 to 8 p.m., Arcadia Elks Lodge, 27 W. Huntington Dr., no admission, fashions from Nordstrom, Macy's, Robinsons-May, Bloomingdale's, 50-70% off store prices, nothing over \$33, sz. 4-24, handbags, scarves, jewelry, girl's clothing, all proceeds donated to disabled children in CA & Hawaii. 626/445-2025.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

Free

CHISENBOP BOOKS (Korean counting method) and records, 45s, children's songs. 626/403-0025.

For Rent

GLENDALE house to share, exclusive location, large furnished room, central courtyard w/fountain, deck w/gazebo, bathroom with garden view, complete house privileges, no smoking/ drinking, \$700. 246-4750. MONTROSE studio apt., detached, 10 min. from JPL, \$485. 626/445-0884.

NORTH ALHAMBRA, borders South Pasadena, 2 bd., 1 ba., upstairs rear unit apartment, kitchen furnished with all appliances, all utilities incl., very private, avail. 8/15, \$1,200 + \$1,200 dep. 626/570-6123.

PASADENA home, 3 bd., 1.75 ba., .5 blk north of Colorado, near PCC, avail. 8/1, \$1,500. 590-2793, Dorothy.

PASADENA, nr. Lake and 210 fwy, 2 bd., 1 ba., in a 4plex unit, spacious and clean, \$795. 952-5568.

PASADENA, room in a furnished 2-bd. apt. near Lake Ave. district, treetop and mtn. view surroundings, tree-lined street, near shopping, PCC, Caltech, underground secured parking, laundry facility, pool, utilities paid, female preferred, \$500 + \$300 deposit. 626/796-8982 or 626/399-6072, cell.

SUNLAND/TUJUNGA townhome, 2 bd., 2 ba., spacious 2-story with mt. view, roof deck, central air, built-ins and 2-car garage, freshly painted and new carpets, \$1,195. 952-5568.

Real Estate

GLENDDORA, 3 bd., 2 ba., family room, custom built-in kitchen, new tile floors in kitchen and bathrooms, hardwood floors in living room and dining area, central air, f/p, 1,560 sq. ft., move-in condition, detached 2-car garage, built-in spa and fruit trees, \$244,500. 949/500-3404 or 626/331-0407.

MONROVIA, beautiful ranch home in the foothills, 4 bd., 1.75 ba., fabulous city lights/mountain views from every room, secluded 18,000 sq. ft. lot, professional landscaping, pool, spa, gazebo, fountain, many fruit trees, office/laundry room in basement with access to garden/pool, newly remodeled kitchen with maple cabinetry and granite countertops, professionally decorated, immaculate, entertainer's delight, \$535,000. 626/351-9117.

Vacation Rentals

BIG BEAR LAKEFRONT, luxury townhome, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, excellent view. 248-8853.

HAWAII, Kona, ocean front on Keauhou Bay, house and guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular view, near restaurants, golf and other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast on beach w/ocean view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwv., d/w, pool, priv. lanai, slps 4, 4/15-12/14 \$105/nt./2, 12/15-4/14 12/nt./2, \$10/nt. add'l person. 949/348-8047.

LAKE TAHOE, North Shore condo, 2 bd., 2.5 ba., sleeps 6, pool, private beach, all amenities, convenient location, available August, weeks only, special JPL discount. 626/355-3886, Rosemary/Ed.

MAMMOTH townhouse, 2 bd. + lg. loft, sleeps 8, beautiful and comfortable, spa, pool, gameroom; rent 4 nights, get 2 nights free w/JPL discount (until 9/1/01). 626/794-6860.

MAMMOTH, Chamonix condo, 2 bd., 2 full ba., sleeps 6, fully equipped elec. kitchen, incl. microwave & extras, f/p & wood, color TV, VCR, cable FM stereo, pool & sun area, game rec. & laundry rms., sauna, play & BBQ areas, o/d Jacuzzis, conv. to shops, hiking, lodge, summer events, daily/weekly rates. 249-8524.

MAMMOTH, Courchevel, fully equipped unit, 2 bd., 2 ba., sleeps 6, summer rates for summer activities, fishing, mountain biking, hiking. 661/255-7958.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, d/w, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE condo, fully furnished 2 bd., 2 ba., f/p, full kitchen, quiet, relaxing, in beautiful setting, located at beachside, with barbeque, pool, spa, game room, and great ocean view, easy walk to pier and restaurants, sleeps 6, available weekly or monthly. 909/981-7492, Jim or Darlene or e-mail dfhauge@yahoo.com.

OCEANSIDE, on the sand, charming 1-bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.

ROSARITO BEACH condo. 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on. priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.